

No.

9300124



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Kansas Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF eighteen YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, (THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM,) TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT.

UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS SEED OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS DESIGNATED BY THE OWNER OF THE RIGHTS. (34 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)
(*Waived, except that this waiver shall not apply to breeder seed, foundation seed, labeling requirements, and blending limitations.)

WHEAT

'Karl 92'

In Testimony Whereof, I have hereunto set
my hand and caused the seal of the Plant
Variety Protection Office to be affixed
at the City of Washington, D.C.
this 30th day of June in
the year of our Lord one thousand nine
hundred and ninety-four.

Attest:

Kenneth B. Coates
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Mike E. Jones
Secretary of Agriculture

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Agriculture, Clearance Office, OIRM, Room 404-W, Washington, D.C. 20250; and to the Office of Management and Budget, Paperwork Reduction Project (OMB #0581-0055), Washington, 20250.

FORM APPROVED: OMB 0581-0055, Expires 1/31/91

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions on reverse)

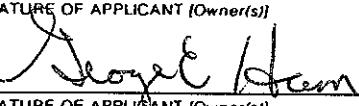
1. NAME OF APPLICANT(S) (as it is to appear on the Certificate)		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO.	3. VARIETY NAME	
Kansas Agriculture Experiment Station		KS831374-142	Karl 92	
4. ADDRESS (street and no. or R.F.D. no., city, state, and ZIP)		5. PHONE (Include area code)	FOR OFFICIAL USE ONLY	
Waters Hall, Kansas State University Manhattan, KS 66502		913-532-6147	PVPO NUMBER 9300124	
6. GENUS AND SPECIES NAME		7. FAMILY NAME (Botanical)	FILING Date Feb. 3, 1993 Time <input type="checkbox"/> A.M. <input type="checkbox"/> P.M.	
Triticum aestivum		Gramineae	Fees Date Feb. 03, 1993, May 21, 1993 Certificate Fee: \$ 275.00 Date April 19, 1994	
8. CROP KIND NAME (Common Name)		9. DATE OF DETERMINATION		
Wheat		08-01-92		
10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.) University				
11. IF INCORPORATED, GIVE STATE OF INCORPORATION		12. DATE OF INCORPORATION		
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS Vernon A. Schaffer, Department of Agronomy, Kansas State University, Throckmorton Hall Manhattan, KS 66506-5501				
PHONE (Include area code): 913-532-6115				
14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow INSTRUCTIONS on reverse)				
a. <input checked="" type="checkbox"/> Exhibit A, Origin and Breeding History of the Variety. b. <input checked="" type="checkbox"/> Exhibit B, Novelty Statement. c. <input checked="" type="checkbox"/> Exhibit C, Objective Description of Variety. d. <input checked="" type="checkbox"/> Exhibit D, Additional Description of Variety. e. <input checked="" type="checkbox"/> Exhibit E, Statement of the Basis of Applicant's Ownership. f. <input checked="" type="checkbox"/> Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office _____ g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,150) made payable to "Treasurer of the United States."				
15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See section 83(a) of the Plant Variety Protection Act.) <input checked="" type="checkbox"/> YES (If "YES," answer items 16 and 17 below) <input type="checkbox"/> NO (If "NO," skip to item 18 below)				
16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?		17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? <input checked="" type="checkbox"/> FOUNDATION <input checked="" type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED		
18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.? <input type="checkbox"/> YES (If "YES," through <input type="checkbox"/> Plant Variety Protection Act <input type="checkbox"/> Patent Act. Give date: _____) <input checked="" type="checkbox"/> NO				
19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES? <input type="checkbox"/> YES (If "YES," give names of countries and dates) <input checked="" type="checkbox"/> NO				
20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable. The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in section 41, and is entitled to protection under the provisions of section 42 of the Plant Variety Protection Act. Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.				
SIGNATURE OF APPLICANT (Owner(s)) 	CAPACITY OR TITLE Associate Director of the Agriculture Experiment Station		DATE 12-15-92	
SIGNATURE OF APPLICANT (Owner(s))	CAPACITY OR TITLE		DATE	

Exhibit A. ORIGIN AND BREEDING HISTORY OF KARL 92.

1986: Karl 92 was selected from a head row increase of breeders seed of Karl.

It was selected because of its slightly earlier heading, darker green appearance, and slightly better reaction to both stem rust and leaf rust under field conditions. Karl 92 is a F_{11} head row from the variety Karl.

1987: Karl 92 was yield tested along with 20 other selections at Manhattan and selected based upon its significant yield advantage (3.2 bu/a) over Karl.

1988: Large scale yield trials and increase planted at Hutchinson was destroyed by a severe Wheat Streak Mosaic Virus infection.

1989: Yield trials planted at Manhattan and Hutchinson showed Karl 92 to have a 1 bu/acre yield advantage over Karl.

1990: Yield trials planted at six locations in Kansas showed Karl 92 to have a 8.3 bu/acre yield advantage over Karl.

1991: Yield trials at nine locations in eastern-central Kansas showed Karl 92 to have a 4.2 bu/acre advantage over Karl. In six locations in western Kansas 142 had a 1.7 bu/acre yield advantage over Karl.

Karl 92 is uniform. Variants are limited to taller plants, slightly later plants, slightly darker plants, awnless or awnleted plants at a frequency of less than one in 10,000. Roguing with the objective of eliminating those off-type continues. Also occurring at a frequency of less than 2% is a fawn color

Exhibit B. NOVELTY STATEMENT.

Karl 92 is an awned, white-glumed, short, hard red winter wheat. It is equal in height to Plainsman V or about 5-6 cm shorter than Newton. Karl 92 is early, being 1/2 day later than Plainsman V, or 4 days earlier than Newton. Its winter hardiness is better than Newton and slightly less than Scout 66. Karl 92 has short blocky heads which fill large kernels at maturity.

Karl 92 is resistant to soil borne mosaic virus and spindle streak virus. It has excellent protection against leaf rust, powdery mildew, tan spot, Septoria leaf blotch, and Septoria glume blotch. It is resistant to race QCC but susceptible to race SR2 of stem rust. It is susceptible to hessian fly and wheat streak mosaic virus.

Karl 92 is most similar to Karl except that Karl 92 is 1/2 day earlier, slightly greener in head appearance at anthesis, uniform nodding heads at maturity compared to erect heads on Karl and approximately 4 bu/acre yield advantage at all locations in Kansas.

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reaction to the Phenol test. The variants as well as the typical plants are commercially acceptable.

Karl 92 is stable. When sexually reproduced the variety remains unchanged in its essential and distinctive characteristics.

U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, MEAT, GRAIN AND SEED DIVISION
BELTSVILLE, MARYLAND 20785
OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (TRITICUM spp.)

INSTRUCTIONS: See Reverse.**NAME OF APPLICANT(S)**

Kansas Agriculture Experiment Station
ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code)
KSU
Waters Hall
Manhattan, KS 66506

FOR OFFICIAL USE ONLY**PVPO NUMBER**

9300124

VARIETY NAME OR TEMPORARY DESIGNATION

Karl 92

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. 0 8 9 or 0 9) when number is either 99 or less or 9 or less.

1. KIND:

1	1 = COMMON	2 = DURUM	3 = EMMER	4 = SPELT	5 = POLISH	6 = POULARD	7 = CLUB
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2. TYPE:

2	1 = SPRING	2 = WINTER	3 = OTHER (Specify) _____	2	1 = SOFT	3 = OTHER (Specify) _____
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2	1 = WHITE	2 = RED	3 = OTHER (Specify) _____
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3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:

2	2	7	FIRST FLOWERING	2	3	3	LAST FLOWERING
---	---	---	-----------------	---	---	---	----------------

4. MATURITY (50% Flowering):

0	4	NO. OF DAYS EARLIER THAN	2	1 = ARTHUR	2 = SCOUT	3 = CHRIS
NO. OF DAYS LATER THAN			2	4 = LEMHI	5 = NUGAINES	6 = LEEDS

5. PLANT HEIGHT (From soil level to top of head):

0	8	5	CM. HIGH
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CM. TALLER THAN			2
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2	0	CM. SHORTER THAN	2	1 = ARTHUR	2 = SCOUT	3 = CHRIS
			2	4 = LEMHI	5 = NUGAINES	6 = LEEDS

6. PLANT COLOR AT BOOTING (See reverse):

2	1 = YELLOW GREEN	2 = GREEN	3 = BLUE GREEN
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8. STEM:

1	Anthocyanin: 1 = ABSENT	2 = PRESENT
---	-------------------------	-------------

1	Hairiness of last internode of rachis: 1 = ABSENT	2 = PRESENT
---	---	-------------

0	4	NO. OF NODES (Originating from node above ground)
---	---	---

9. AURICLES:

1	Anthocyanin: 1 = ABSENT	2 = PRESENT
---	-------------------------	-------------

10. LEAF:

1	Flag leaf at booting stage: 1 = ERECT	2 = RECURVED
---	---------------------------------------	--------------

1	Hairs of first leaf sheath: 1 = ABSENT	2 = PRESENT
---	--	-------------

1	0	MM. LEAF WIDTH (First leaf below flag leaf)
---	---	---

7. ANTER COLOR:

1	1 = YELLOW	2 = PURPLE
---	------------	------------

1	Waxy bloom: 1 = ABSENT	2 = PRESENT
---	------------------------	-------------

1	Internodes: 1 = HOLLOW	2 = SOLID
---	------------------------	-----------

1	6	CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW
---	---	---

1	Hairiness: 1 = ABSENT	2 = PRESENT
---	-----------------------	-------------

2	Flag leaf: 1 = NOT TWISTED	2 = TWISTED
---	----------------------------	-------------

1	Waxy bloom of flag leaf sheath: 1 = ABSENT	2 = PRESENT
---	--	-------------

2	4	CM. LEAF LENGTH (First leaf below flag leaf):
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11. HEAD:

1 Density: 1 = LAX 2 = DENSE

1 Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE
4 = OTHER (Specify) _____

4 Awnedness: 1 = AWNLESS 2 = APICALLY AWNLETTED 3 = AWNLETTED 4 = AWNED

1 Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED
5 = BROWN 6 = BLACK 7 = OTHER (Specify) _____

0 6 CM. LENGTH

1 4 MM. WIDTH

12. GLUMES AT MATURITY:

3 Length: 1 = SHORT (CA. 7 mm.) 2 = MEDIUM (CA. 8 mm.)
3 = LONG (CA. 9 mm.)

2 Width: 1 = NARROW (CA. 3 mm.) 2 = MEDIUM (CA. 3.5 mm.)
3 = WIDE (CA. 4 mm.)

3 Shoulder: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED
shape: 4 = SQUARE 5 = ELEVATED 6 = APICULATE

3 Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE

13. COLEOPTILE COLOR:

1 1 = WHITE 2 = RED 3 = PURPLE

1 1 = ABSENT 2 = PRESENT

15. JUVENILE PLANT GROWTH HABIT:

1 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

16. SEED:

1 Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL

1 Cheek: 1 = ROUNDED 2 = ANGULAR

2 Brush: 1 = SHORT 2 = MEDIUM 3 = LONG

1 Brush: 1 = NOT COLLARED 2 = COLLARED

Phenol reaction 1 = IVORY 2 = FAWN 3 = LT. BROWN
(See instructions): 4 = BROWN 5 = BLACK

3 Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER (Specify) _____

0 6 MM. LENGTH

0 3 MM. WIDTH

3 2 GM. PER 1000 SEEDS

17. SEED CREESE:

2 Width: 1 = 60% OR LESS OF KERNEL 'WINOKA'
2 = 80% OR LESS OF KERNEL 'CHRIS'
3 = NEARLY AS WIDE AS KERNEL 'LEMHI'

1 Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT'
2 = 35% OR LESS OF KERNEL 'CHRIS'
3 = 50% OR LESS OF KERNEL 'LEMHI'

18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

2 STEM RUST
(Races) _____

2 LEAF RUST
(Races) _____

0 STRIPE RUST
(Races) _____

0 LOOSE SMUT

2 POWDERY MILDEW

0 BUNT

2 OTHER (Specify) soil borne mosaic virus

19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

0 SAWFLY

0 APHID (Bydv.)

GREEN BUG

CEREAL LEAF BEETLE

OTHER (Specify) _____

HESSIAN FLY

RACES:

GP

D

A

E

B

F

C

G

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Karl	Seed size	Karl
Leaf size	Karl	Seed shape	Karl
Leaf color	Karl	Coleoptile elongation	Karl
Leaf carriage	Karl	Seedling pigmentation	Karl

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

(a) L.W. Briggle and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States, Technical Bulletin 1278, United States Department of Agriculture.

(b) W.E. Walls, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the handbook of seed testing prepared by the Association of Official Seed Analysts. (See attachment.)

LEAF COLOR: Nickerson's or any recognized color fan should be used to determine the leaf color of the described variety.

Exhibit D. ADDITIONAL DESCRIPTION OF VARIETY.

Karl 92 is a selection from a head row increase of breeders seed at Karl. It was selected because of its slightly earlier heading, darker green appearance and slightly better reaction to both stem rust and leaf rust under field condition. Karl 92 has the same area of adaptation as Karl being statewide, but best adapted to central, south central and eastern Kansas.

Karl 92 is most similar to Karl in appearance except Karl 92 is slightly darker green at anthesis and more uniform at heading. At maturity the heads of nod while the heads of Karl are erect. Variants are limited to slightly taller plants, slightly darker plants, slightly later plants, and beardless plants at a frequency of less than 1 in 10,000. A fawn color reaction to the Phenol test occurs at a frequency of less than 2%.

Karl 92 has good tolerance to leaf rust, stem rust (QCC race) powdery mildew, tan spot, Septoria leaf blotch, Septoria glume blotch, soil borne mosaic virus and spindle streak mosaic virus. It is susceptible to Hessian Fly, Greenbugs, and Russian wheat aphid.

Karl 92 breeders seed will be maintained by Kansas Agricultural Experiment Station, Manhattan, KS.

Table I. Kansas Instrastate Nursery (1992)¹

Entry No.	Selection No.	Variety or Pedigree	No. Years Tested
101	PI527480	Karl	9
102	PI1485594	Tam 107	9
103	W558/W603	2163	3
104	PI532912	2180	2
105		Tomahawk	1
106	PI531245	Sierra	2
107		Arapahoe	1
108		Tam 202	1
109	KS87H325-2-1	LR16/LR17//LES/3/CHY/LES/4/ BNT'S'/5/Tam 107	2
110	KS89H48-1	Dular/EGL/ ² *CHY/LES/3/Colt	2
111	KS89H50-4	" " "	2
112	KS831374-142	Karl reselection (Karl 92)	2
113	PI511307	Abilene	4
114	KS84170E-8-2	Hawk/(PKG16/Lovl3//JGW3)/T108	1
115	KS84170E-7-1	" " "	1
116	KS84273BB-10-3	(SMB/PCHU//KAL/BB)/T107//AKN	1
117	KS83364D-6	F29-26/KS831440//Mustang	1
118	KS84W063-9-6	KS82W418/Stephens	1
119	KS84W063-9-7	" "	1
120	KS84W063-9-12	" "	1
121	KS84W063-9-18	" "	1
122	KS84W063-9-45	" "	1
123	KS87807-11	KS831374-141B/OR8305734	1
124	KS87807-23	" "	1
125	KS87822-2	KS831374-154B/OR8300764	1
126		Larned	
127	KS91H174		
128	KS91H184		
129	KS91H158		
130	KS91H153		

¹The USGMRL numbers were 92-601 to 92-625 for the Eastern KIN including Entry No. 101 to 125 and 92-631 to 92-660 for the Western KIN including Entry No. 101 to 130.

Table II. Chemical and Milling Data for the Eastern and Western Kansas Intraplate Nursery Composites of Hard Winter Wheat Lines Harvested in 1992.^{a,b}

Wheat Line	Wt/Bu ^c (1b)	Kernel Weight (g)	Protein (%)	Ash (%)	L (%)	M (%)	S (%)	Kernel Sizing ^d		Hardness Score ^e	
								NIR	SKWCS	USGMRL	Miller's Subject.
Eastern Composites											
Karl	59.2	28.6	1.51	13.1	52.0	46.7	1.3	51	66	6	72.7
Tam 107	55.0	25.6	1.56	12.2	33.0	64.2	2.8	58	75	6	71.0
2163	54.5	27.7	1.61	12.4	37.1	59.1	3.8	51	71	6	70.4
2180	55.8	25.0	1.54	13.7	33.3	64.2	2.5	75	81	6	71.3
Tomahawk	55.9	25.8	1.61	13.3	34.8	61.8	3.3	55	76	5	69.9
Sierra	56.5	22.5	1.65	13.3	29.1	64.8	6.1	61	80	5	70.3
Arapahoe	56.7	25.0	1.69	13.2	19.9	76.3	3.8	65	77	6	70.7
Tam 202	54.1	20.2	1.71	13.1	25.8	65.6	8.6	53	71	5	68.4
KS87H325-2	58.9	31.1	1.48	12.7	61.6	37.0	1.4	67	70	6	72.0
KS89H48-1	58.2	28.2	1.55	12.8	36.1	62.2	1.7	51	66	6	71.8
KS89H50-4	57.7	27.4	1.58	12.6	28.2	63.6	3.2	49	69	6	71.3
Karl 92	58.1	28.3	1.48	12.8	43.4	54.6	2.0	47	66	6	72.2
Abilene	56.2	19.7	1.69	13.5	8.3	84.1	7.6	51	71	5	68.5
KS84170E-8-2	57.6	29.1	1.62	13.5	49.2	43.7	2.1	41 Q	59	5	69.5
KS84170E-7-1	56.9	29.5	1.67	13.5	51.3	46.2	2.5	42 Q	61	5	68.4
KS84273BB-10-3	56.3	26.0	1.69	13.9	39.1	56.9	4.0	50	61	5	69.7
KS83364D-6	57.2	26.1	1.61	13.4	50.2	46.4	3.4	52	67	5	68.8
KS84W063-9-6	57.2	26.0	1.52	14.0	41.1	56.2	2.7	67	76	6	71.5
KS84W063-9-7	57.3	30.7	1.57	14.1	62.7	36.0	1.3	66	74	6	72.2
KS84W063-9-12	57.1	27.1	1.56	13.7	54.0	44.2	1.8	72	77	6	73.0
KS84W063-9-18	58.7	28.2	1.55	13.8	46.6	51.6	1.8	68	82	6	71.9
KS84W063-9-45	57.7	28.9	1.57	14.2	56.2	42.2	1.6	75	84	6	71.2
KS87807-11	56.7	28.7	1.49	13.3	55.0	62.0	3.0	48	60	6	70.6
KS87807-23	57.7	28.8	1.44	13.2	39.6	58.4	2.0	47	59	6	72.3
KS87822-2	58.2	25.9	1.51	13.0	40.0	57.6	2.4	62	76	6	72.9
(Average)	(57.0)	(26.8)	(1.58)	(13.3)	(41.1)	(56.6)	(3.1)	(57)	(71)	(5.7)	(70.9)

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Table II. (Continued)

Wheat Line	Kernel Wt/Bu ^c (lb)	Weight (g)	Ash (%)	Protein (%)	L (%)	M (%)	S (%)	Kernel Sizing ^d			Hardness Score ^e		
								NIR	USGMRL SKWGS	Millers' Subject.	NIR	USGMRL SKWGS	Millers' Subject.
<u>Western Composites</u>													
Karl	60.3	31.2	1.43	15.2	50.5	49.3	0.2	54	69	5	70.1	81	
Tam 107	62.0	34.4	1.24	12.1	63.8	35.8	0.4	67	87	6	71.8	77	
2163	59.5	29.8	1.32	12.4	43.6	56.0	0.4	59	82	6	71.0	80	
2180	61.6	30.5	1.35	13.7	50.7	49.2	0.1	85	88	6	70.6	80	
Tomahawk	60.5	29.3	1.40	13.7	54.5	45.0	0.5	56	82	5	70.7	81	
Sierra	61.2	27.5	1.43	13.5	42.5	56.2	1.3	60	90	5	70.5	77	
Arapahoe	59.6	27.6	1.50	13.3	32.7	66.7	0.6	65	89	6	71.5	83	
Tam 202	61.8	30.6	1.44	12.3	54.8	44.5	0.7	63	96	6	72.5	80	
KS87H325-2-1	61.9	32.1	1.38	13.4	71.0	28.8	0.2	80	92	6	71.6	80	
KS89H48-1	61.5	31.3	1.30	13.0	47.2	52.7	0.1	52	84	6	73.1	80	
KS89H50-4	61.7	29.7	1.35	13.0	35.6	63.5	0.8	45 Q	82	6	72.9	83	
Karl 92	60.1	31.0	1.37	14.9	58.8	41.0	0.2	53	85	6	73.9	79	
Abilene	60.5	32.7	1.48	15.1	62.3	37.3	0.4	57	83	6	74.2	83	
KS84170E-8-2	61.2	33.4	1.41	13.8	72.5	27.2	0.3	50	75	6	74.1	86	
KS84170E-7-1	61.5	37.7	1.42	13.9	85.2	14.7	0.1	53	77	6	74.6	83	
KS84273BB-10-3	61.1	31.2	1.41	14.0	60.3	39.2	0.5	56	78	6	74.7	83	
KS83364D-6	61.6	34.6	1.39	14.0	76.3	23.2	0.5	57	78	6	74.5	80	
KS84W063-9-6	60.9	32.3	1.40	14.8	70.7	29.0	0.3	66	82	6	74.0	80	
KS84W063-9-7	60.4	32.6	1.40	14.2	74.2	25.5	0.3	70	85	7	72.6	76	
KS84W063-9-12	60.6	31.3	1.32	13.8	66.7	33.0	0.3	74	90	7	75.3	79	
KS84W063-9-18	60.6	30.9	1.37	14.4	59.0	40.5	0.5	72	86	7	73.8	79	
KS84W063-9-45	59.9	33.2	1.40	13.9	72.3	27.0	0.7	75	94	7	73.9	79	
KS87807-11	60.6	32.6	1.42	14.6	66.0	33.5	0.5	55	73	6	71.7	83	
KS87807-23	59.7	31.7	1.41	15.5	51.4	47.8	0.8	53	71	6	73.9	78	
KS87822-2	60.4	30.0	1.50	13.9	60.3	39.5	0.2	65	91	6	74.5	89	
Larned	61.7	32.3	1.29	12.6	57.0	45.5	0.5	61	83	6	73.4	79	
KS91H174	61.6	28.3	1.51	13.4	40.0	58.8	1.2	54	81	5	70.3	83	
KS91H184	61.3	26.4	1.45	13.0	22.8	76.3	0.9	65	87	6	71.7	85	
KS91H158	61.7	35.9	1.35	12.9	65.3	34.5	0.2	78	88	6	73.8	86	
KS91H153	62.1	33.3	1.30	12.6	50.7	48.5	0.8	70	83	6	73.4	78	
(Average)	(61.0)	(31.5)	(1.39)	(13.7)	(42.3)	(0.4)	(62)	(83)	(6.0)	(72.8)	(87)		

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Table II. (Continued)

^aData expressed on a 14% moisture basis.

Eastern growing locations = Belleville, Caldwell, Hesston, Hutchinson, Manhattan, and St. John.
 Western growing locations = Garden City (Dryland), Garden City (Irrigated), Graham, Hays, and Ness Co.

^bS, Q, U = satisfactory, questionable, and unsatisfactory quality with respect to property in question. A satisfactory rating is inferred in the absence of a designated one.

^cWt/Bu = weight per bushel.

^dL = large kernels (overs of Tyler #7); M = medium kernels (overs of Tyler #9); S = small kernels (thrus of Tyler #9).

^eWheat hardness scores were determined by NIR (Dickey John, Instalab 600) of bulk samples and by the USGML Single Kernel Hardness Tester (SKHT) of each kernel; the higher the value, the harder the wheat sample. Miller's Subjective Scores: 1-3 - too soft, unacceptable for hard wheat milling; 4-7 - acceptable for hard wheat milling (4 - softer than average; 5-7 - average); 8-10 - harder than average, would lengthen grinding time and could cause reduction in flour quality.

^fMilling scores (MS) were derived from test weight (TW), flour yield (FY), and the ash and protein conversions.

$$MS = 100 - \{(TW - 60) + (82 - FY) + 100(FA - WA/3.9) + 10[(WP - 1) - FP]\}$$

 FA = Flour ash; WA = wheat ash;
 FP = flour protein; WP = wheat protein.

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Table III. Chemical and Mixograph Data for the Eastern and Western Kansas Intrastate Nursery Composites of Hard Winter Wheat Lines Harvested in 1992.^{a,b}

Wheat Line	FLOUR			Ab-sorp-tion (%)	MIXOGRAPH			Mixing Tolerance ^e
	Ash (%)	Pro-tein (%)	Color Value ^c		Mix Time As Rec'd (min)	Corr. (min)		
<u>Eastern Composites</u>								
Karl	0.41	12.3	83	62.9	4.88	-		4
Tam 107	0.45	11.1	80	60.1	3.88	3.47		5
2163	0.47	11.4	82	60.7	2.88	2.68		3
2180	0.46	12.8	77	63.2	3.50	-		4
Tomahawk	0.41	12.0	81	62.6	3.50	-		4
Sierra	0.42	11.8	81	62.8	2.75	2.70		3
Arapahoe	0.48	11.9	80	62.8	4.38	4.35		5
Tam 202	0.48	11.5	80	61.9	5.38	5.08		5
KS87H325-2-1	0.45	11.4	80	61.6	4.63	4.32		4
KS89H48-1	0.41	11.4	83	62.9	4.50	4.20		4
KS89H50-4	0.40	11.5	84	63.0	5.00	4.71		4
Karl 92	0.43	11.5	85	62.9	7.50	7.06		5
Abilene	0.44	12.3	82	64.7	4.13	-		4
KS84170E-8-2	0.40	12.7	85	61.8	2.50 U	-	1 Q-U	
KS84170E-7-1	0.42	12.6	85	61.2	2.50 U	-	1 Q-U	
KS84273BB-10-3	0.40	12.5	82	60.8	4.00	-		4
KS83364D-6	0.43	12.3	84	60.8	3.38	-		3
KS84W063-9-6	0.51	12.8	80	64.5	4.63	-		4
KS84W063-9-7	0.52	13.0	81	66.3	3.75	-		4
KS84W063-9-12	0.54	13.0	79	64.5	4.13	-		4
KS84W063-9-18	0.49	13.0	79	64.3	3.88	-		4
KS84W063-9-45	0.52	13.2	77	64.7	3.38	-		3
KS87807-11	0.42	12.5	84	64.7	6.00	-		5
KS87807-23	0.40	12.2	84	64.5	6.00	-		4
KS87822-2	0.45	12.3	81	64.3	4.38	-		4
(Average)	(0.45)	(12.0)	(82)	(63.0)	(4.22)	(4.12)	(3.8)	
<u>Western Composites</u>								
Karl	0.43	14.1	81	67.7	3.38	-		3
Tam 107	0.41	11.0	83	63.8	4.00	3.51		5
2163	0.43	11.4	86	63.1	2.38 U	2.20		3
2180	0.43	12.8	82	67.3	3.00	-		3
Tomahawk	0.40	12.4	81	68.0	3.63	-		4
Sierra	0.42	11.9	84	66.1	2.63 Q	2.61		3
Arapahoe	0.45	12.2	82	66.0	3.50	-		4
Tam 202	0.46	11.3	85	64.5	4.63	4.23		4
KS87H325-2-1	0.42	12.3	81	66.5	3.38	-		3

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Table III. (Continued)

Wheat Line	FLOUR			Ab- sorp- tion (%)	MIXOGRAPH			Mixing Toler- ance ^e		
	Ash (%)	Pro- tein (%)	Color Value ^c		Mix Time					
					As Rec'd (min)	Corr. (min)				
KS89H48-1	0.42	11.8	83	66.1	3.63	3.56	4			
KS89H50-4	0.41	12.0	84	66.1	4.50	-	4			
Karl 92	0.45	13.6	79	67.6	3.63	-	4			
Abilene	0.46	14.0	79	69.3	4.13	-	4			
KS84170E-8-2	0.45	13.1	85	65.5	2.13 U	-	0 U			
KS84170E-7-1	0.44	12.8	85	64.8	1.75 U	-	0 U			
KS84273BB-10-3	0.42	12.8	81	62.0	3.00	-	3			
KS83364D-6	0.45	12.9	84	64.0	2.63 Q	-	2 Q			
KS84W063-9-6	0.48	13.9	78	66.0	2.88	-	3			
KS84W063-9-7	0.49	13.1	79	65.7	3.00	-	3			
KS84W063-9-12	0.50	13.1	79	67.7	3.63	-	3			
KS84W063-9-18	0.48	13.5	79	67.1	3.38	-	3			
KS84W063-9-45	0.53	13.2	77	67.5	2.88	-	3			
KS87807-11	0.43	13.7	84	68.3	5.38	-	4			
KS87807-23	0.45	13.9	80	68.8	3.75	-	4			
KS87822-2	0.45	13.3	80	64.8	3.00	-	3			
Larned	0.44	11.6	84	66.1	2.88	2.75	3			
KS91H174	0.41	12.2	85	65.0	4.63	-	4			
KS91H184	0.41	12.0	83	64.3	3.75	-	4			
KS91H158	0.38	11.8	81	64.1	4.38	4.28	5			
KS91H153	0.41	11.3	82	64.0	4.38	3.99	4			
(Average)	(0.44)	(12.6)	(82)	(65.9)	(3.46)	(3.40)	(3.3)			

^aData expressed on a 14% moisture basis.Eastern growing locations = Belleville, Caldwell, Hesston, Hutchinson,
Manhattan, and St. John.Western growing locations = Garden City (Dryland), Garden City (Irrigated),
Graham, Hays, and Ness Co.^bO, E, S, Q, and U = outstanding, excellent, satisfactory, questionable, and
unsatisfactory quality with respect to property in question. A satisfactory
rating is inferred in the absence of a designated one. One unsatisfactory
rating characterizes a variety as undesirable for hard winter wheat milling
and breadmaking purposes.^cColor values were obtained by an Agtron Photoelectric Colorimeter with a
modified method (AACC Method 14-30) using flour samples rather than using
slurry samples with Agtron certified calibration disks "63" for 0% setting
and "97" instead of "85" for 100% setting.^dMixing times for samples having less than 12% protein were corrected to
12% protein. (-) denotes the same mix time on as received (Rec'd) basis.^eMixing tolerance was rated with numbers: 6 for O; 5 for E; 4 for S; 3 for
S-Q; 2 for Q; 1 for Q-U; and 0 for U.

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Table IV. Bread-Making Data for the Eastern and Western Kansas Intrastate Nursery Composite Flours of Hard Winter Wheat Lines Harvested in 1992. ^{a,b}

Wheat Line	FLOUR Pro-tein (%)	Ab-sorp-tion (%)	Mix Time ^c		Ascorbic Acid (ppm)	Crumb Grain ^d	As Rec'd (cc)	Loaf Volume ^e	
			As Rec'd (min)	Corr. (min)				Corrected to 12.5% F (cc)	Regression (cc/%)
<u>Eastern Composites</u>									
Karl	12.3	66.6	5.63	-	50	3	945	957	69
Tam 107	11.1	68.3	5.00	4.47	50	3	910	1010	75
2163	11.4	65.2	3.63	3.37	50	3	870	942	68
2180	12.8	68.4	4.75	-	50	3	960	941	68
Tomahawk	12.0	64.6	3.88	-	50	3	875	907	64
Sierra	11.8	65.7	2.88	2.83	50	3	873	915	65
Arapahoe	11.9	65.7	4.88	4.85	50	3	815	847	58 U
Tam 202	11.5	70.5	6.88	6.50	50	3	950	1021	76
KS87H325-2-1	11.4	68.8	4.63	4.32	50	3	827	892	62
KS89H48-1	11.4	65.2	5.38	5.02	50	3	930	1007	74
KS89H50-4	11.5	66.1	6.13	5.78	50	3	950	1023	76
Karl 92	11.5	65.1	8.13 Q	7.65	50	4	838	899	63
Abilene	12.3	66.2	5.00	-	50	3	938	952	69
KS84170E-8-2	12.7	64.1	2.63 Q	-	50	2 Q	850	841	57 U
KS84170E-7-1	12.6	61.9	2.50 U	-	50	2 Q	828	824	55 U
KS842273BB-10-3	12.5	63.2	4.38	-	50	3	895	895	63
KS833364D-6	12.3	65.6	3.25	-	50	3	863	875	61
KS84W063-9-6	12.8	66.7	4.88	-	50	3	1003	985	72
KS84W063-9-7	13.0	68.2	4.25	-	50	2 Q	970	935	67
KS84W063-9-12	13.0	69.2	5.38	-	50	3	1025	990	73
KS84W063-9-18	13.0	68.6	4.38	-	50	3	970	935	67
KS84W063-9-45	13.2	70.9	4.25	-	50	3	1005	956	69
KS87807-11	12.5	67.9	7.88 Q	-	50	3	965	965	70
KS87807-23	12.2	67.2	7.50	-	50	3	920	943	68
KS87822-2	12.3	66.5	4.50	-	50	2 Q	945	960	69
(Average)	(12.0)	(66.7)	(4.90)	(4.79)	(50)	(2.9)	(917)	(937)	(67)

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Table IV. (Continued)

Wheat Lines	FLOUR Protein (%)	Ab-sorp-tion (%)	Mix Time ^c As Rec'd (min)	Corr. (min)	Ascorbic Acid (ppm)	Crumb Grain	As Rec'd (cc)	Loaf Volume ^e		
								Corrected to 12.5% P (cc)	12.5% P (cc)	Regression (cc/%)
<u>Western Composites</u>										
Karl	14.1	70.4	4.63	-	50	2 Q	1000	897	63	
Tam 107	11.0	69.7	4.00	3.51	50	2 Q	845	945	68	
2163	11.4	67.1	2.75 Q	2.54 U	50	2 Q	810	876	61	
2180	12.8	70.6	4.50	-	50	3	935	913	65	
Tomahawk	12.4	70.4	4.88	-	50	3	860	669	60	
Sierra	11.9	68.9	3.25	3.23	50	3	880	916	65	
Arapahoe	12.2	66.7	4.63	-	50	3	875	893	62	
Tam 202	11.3	70.5	5.75	5.25	50	2 Q	920	1009	75	
KS87H325-2-1	12.3	71.7	3.88	-	50	3	810	821	55	U
KS89H48-1	11.8	67.5	5.25	5.14	50	2 Q	935	983	72	
KS89H50-4	12.0	68.4	5.75	-	50	3	928	959	69	
Karl 92	13.6	71.6	5.75	-	50	2 Q	925	663	59	U
Abilene	14.0	73.1	6.50	-	50	2 Q	978	885	62	
KS84170E-8-2	13.1	65.2	2.38 U	-	50	2 Q	803	772	50	U
KS84170E-7-1	12.8	62.7	1.88 U	-	50	1 Q-U	768	754	48	U
KS84273BB-10-3	12.8	66.5	3.88	-	50	2 Q	878	859	59	U
KS83364D-6	12.9	66.5	2.75 Q	-	50	2 Q	870	848	58	U
KS84W063-9-6	13.9	71.4	3.75	-	50	3	980	893	62	
KS84W063-9-7	13.1	71.1	3.25	-	50	3	983	942	68	
KS84W063-9-12	13.1	70.2	5.38	-	50	4	1000	959	69	
KS84W063-9-18	13.5	70.2	3.50	-	50	2 Q	965	904	64	
KS84W063-9-45	13.2	72.7	4.00	-	50	2 Q	938	894	63	
KS87807-11	13.7	71.9	7.50	-	50	4	1035	954	69	
KS87807-23	13.9	61.5	5.25	-	50	3	985	895	63	
KS87822-2	13.3	68.5	3.75	-	50	3	940	893	62	
Larned	11.6	68.4	3.63	3.47	50	3	892	951	68	
KS91H174	12.2	68.7	5.13	-	50	3	905	922	65	
KS91H184	12.0	66.7	4.88	-	50	3	910	946	68	
KS91H158	11.8	69.2	4.13	4.03	50	4	845	888	62	
KS91H153	11.3	67.0	5.50	5.01	50	3	867	950	68	
(Average)	(12.6)	(68.8)	(4.40)	(4.33)	(50)	(2.6)	(909)	(902)	(63)	18

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Table IV. (Continued)

^aData expressed on a 14% moisture basis. Flour protein contents were included in this table also for a reference.

Eastern growing locations = Belleville, Caldwell, Hesston, Hutchinson, Manhattan, and St. John.
Western growing locations = Garden City (Dryland), Garden City (Irrigated), Graham, Hays, and Ness Co.

^bO, E, S, Q, and U = outstanding, excellent, satisfactory, questionable, and unsatisfactory quality with respect to property in question. A satisfactory rating is inferred in the absence of a designated one. One unsatisfactory rating characterizes a variety as undesirable for hard winter wheat milling and breadmaking purposes.

^cMixing times for samples having less than 12% protein were corrected (Corr.) to 12% protein. (-) denotes the same mix time on as received (Rec'd) basis.

^dCrumb grain was rated with numbers: 6 for O; 5 for E; 4 for S; 3 for Q-S; 2 for Q; 1 for Q-U; 0 for U.

^eCorrected loaf volumes were calculated to the approximate average flour protein (P) content (12.5%) of this sample set. Regression value serves as a descriptor of the loaf volume potential of the progeny.

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Table 3: Milling and Baking Comparisons between Karl and KS831374-142 for 1989 and 1990.

Entry	FLR	Yld %	FLR Protein	Mixogram			Baking Data		
				Absorp.	Mix time	Tol.	Absorp.	Mix Time	Crumb Loaf Vol.
<u>Eastern</u>									
Karl	70.1	13.4	62.9	4.63	8	66.6	4.88	8	998
KS-142	72.4	12.5	61.4	5.13	8	64.4	5.25	8	943
<u>Western</u>									
Karl	73.7	12.4	61.0	4.13	8	63.9	5.00	8	959
KS-142	77.9	13.0	59.9	4.00	8	64.0	4.88	8	995

Table 4: Milling and Baking Comparisons between Karl and KS831374-142 for 1991.

Entry	FLR	Yld %	FLR Protein	Mixogram			Baking Data		
				Absorp.	Mix time	Tol.	Absorp.	Mix Time	Crumb Loaf Vol.
<u>Eastern</u>									
Karl	71.5	14.2	63.5	4.88	8	68.6	7.25	7	1084
KS-142	76.2	13.4	61.4	5.38	8	67.0	8.25	7	1023
<u>Western</u>									
Karl	73.9	14.6	64.0	4.25	8	69.8	7.75	6	1053
KS-142	74.5	13.8	62.0	4.38	8	68.1	7.75	8	1065

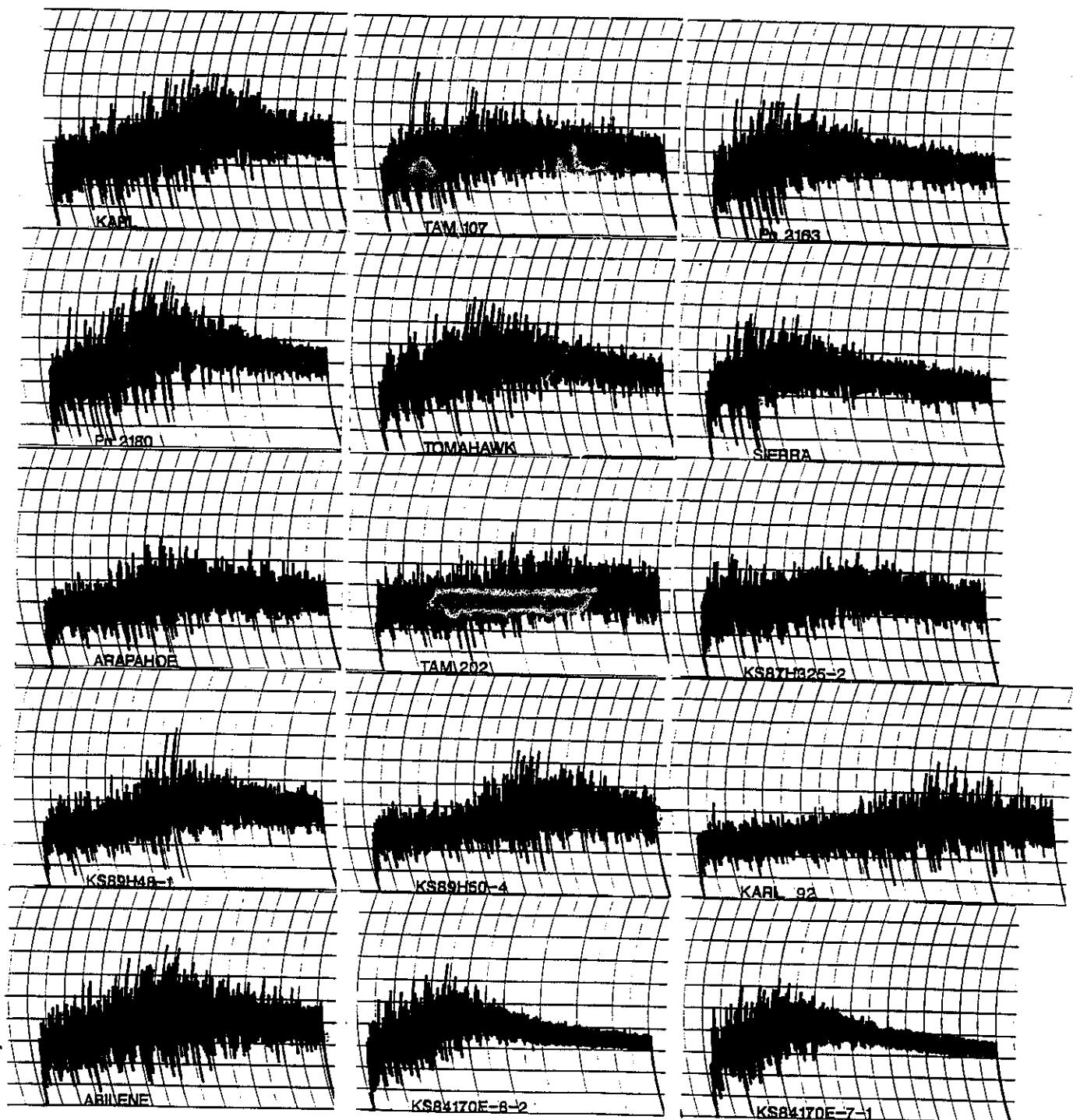


Fig. 4. Mixograms (10 of flour) for the Eastern Kansas Intrastate Nursery composites harvested in 1992. Mixing time is the time (min) to the peak. Mixing tolerance is the slope and width after the peak and stability of mixogram height on either side of the peak. Major arcs are at 1-min intervals.

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Exhibit E. Statement of the Basis of Applicant Ownership

The variety for which Plant Variety Protection is hereby sought was developed by Dr. R.G. Sears, an employee of Kansas State University Experiment Station, all rights to any invention, discovery, or development made by the employee while employed by Kansas State University Experiment Station, were assigned by Kansas State University Experiment Station with no rights of any kind retained by the employees.



United States
Department of
Agriculture

Agricultural
Marketing
Service

Science
Division

Plant Variety Protection Office
NAL Building, Room 500
10301 Baltimore Blvd.
Beltsville, MD 20705-2351

PLANT VARIETY PROTECTION OFFICE

Gentlemen:

Subject: Application No. 9300124

Variety and Kind: 'Karl 92' WHEAT

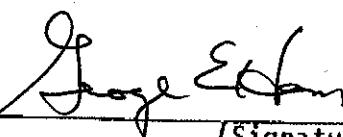
As provided in section 83(a) of the Plant Variety Protection Act, 7 U.S.C. 2321, we request that the Certificate on the above variety be issued with a notation on the Certificate that the right to exclude others from selling, offering for sale, reproducing, importing or exporting the variety covered by this Certificate, or using it in producing a hybrid or different variety is waived, except that this waiver shall not apply to breeders seed, foundation seed, labeling requirements, and blending limitations.

It has been agreed that the Certificate should be issued in the name(s) of:

Kansas Agricultural Experiment Station

6-17-94
(Date)




(Signature)

Dr. George Ham
Director
Kansas Agricultural Experiment Station

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